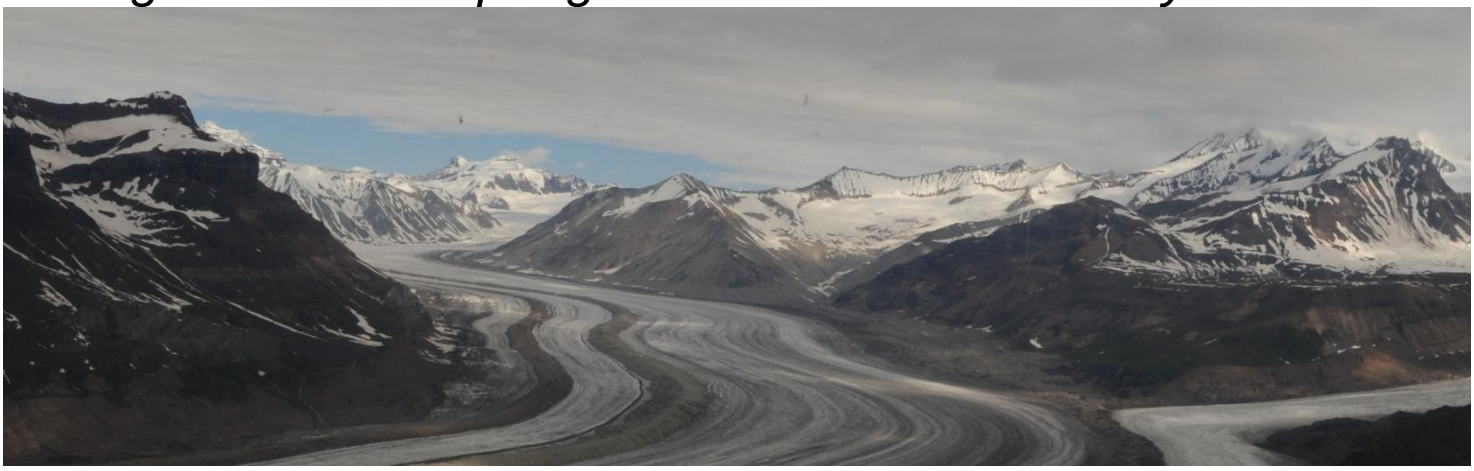
# Weather and Climate

## *Wrangell-St. Elias Spring 2014 Weather Summary*



## Spring Temperatures 2014

In Gulkana, March temperatures were near normal at the beginning of the month, followed by a warm spell March 11-14. The daily highs of 44° F and 43° F on March 13 and 14 tied previous records set in 2005 and 1947. Temperatures dropped for the remainder of the month and March 2014 ended up 1.3° F cooler than normal. April temperatures were near normal except for a cold snap April 9-12. The low temperature for the month was -11° F on April 10. May started out warm with high temperatures in the upper 60s. Warmer than normal temperatures persisted through May 17, contributing to an average monthly temperature of 49.2° F, 4.0° F warmer than normal and the second warmest May since reliable records began in 1949 (Figure 1, Table 1).

In Yakutat, clear nights the first week of March resulted in colder than normal night-time minimums, but daytime highs were about average. The low temperature for the month was 2° F on March 2. Overall, the average temperature for March was 30° F compared to a normal of 32° F. Both daily highs and lows were near normal in April. The average monthly temperature was 37.2° F. Persistent, clear weather the first few weeks of May led to record high temperatures on May 1st (66° F), 2nd (73° F), and 3rd (79° F). The rain returned on May 18 (see page 2) and temperatures dropped back to normal values. The month of May ended up at 47.1° F compared to a normal monthly temperature of 44.7° F. (Figure 1, Table 2).

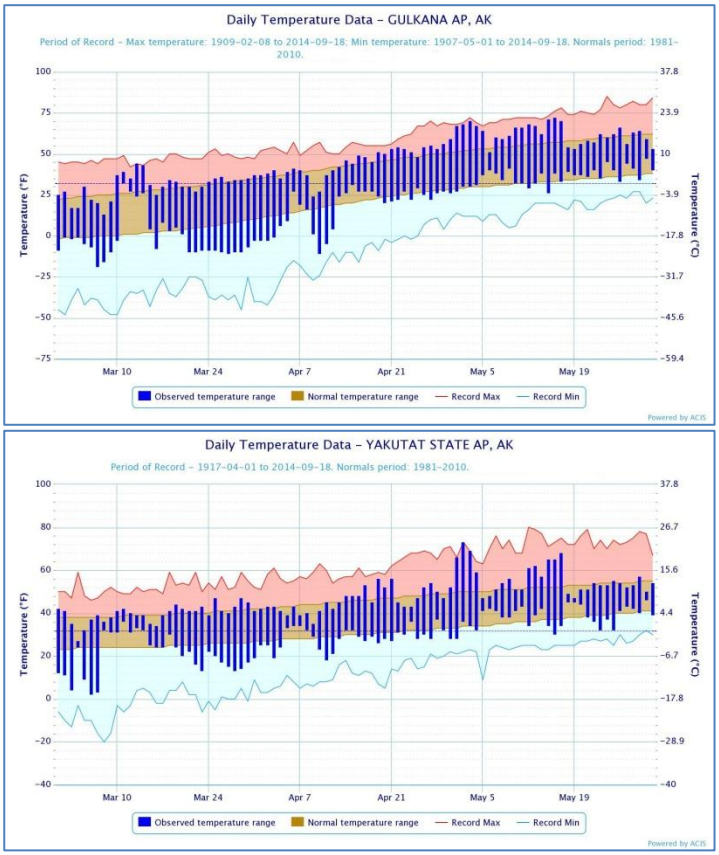



Figure 1. Spring 2014 daily temperatures at Gulkana (top) and Yakutat (bottom) showing record maximum (red), record minimum (blue), normal (brown) and **2014 observed** daily range (blue).

## Spring Precipitation 2014

In Gulkana, it only snowed one day in March. A measly 0.01 inches of precipitation was recorded on March 11. Extremely dry March's are not unheard of, however. There have been 7 years since 1950 with zero March precipitation. The dry spell ended on April 7 with a pervasive storm system extending from the Southcentral region. 0.30 inches of precipitation was recorded April 7-9. Only 0.03 more inches of precipitation on April 24 brought the monthly total to 0.33 inches, 138% of normal April. Dry weather continued in Gulkana throughout most of May. Only one significant storm occurred in the month totaling 0.17 inches of rain on May 18. Monthly precipitation was 26% of normal. With only 0.51 inches of rain for the spring season compared to a normal of 1.19 inches, 2014 was the driest spring since 2001. (Figure 2, Table 1)

In Yakutat, the first week of spring was dry. The pattern changed mid-month with measureable precipitation almost every day March 7-18, totaling 4 inches for the period. Most of this precipitation fell as rain or wet snow. Snow depth decreased from 12 inches to 9 inches. The remainder of the month was dry and no precipitation was recorded March 19-31. In total, 4.05 inches of precipitation was recorded in March, compared to a normal total of 11.04 inches. April had 13 days with measurable precipitation, including 5.7 inches of snow on April 9 (a record for the date). Melt-out occurred on April 15. Overall, monthly precipitation was only 42% of normal. The first two weeks of May were warm (see page 1) and dry. The dry spell ended dramatically on May 19 with 1.77 inches of rain. A few smaller storms the last week of the month brought the monthly total to 4.13 inches, 50% of normal. Overall, spring precipitation in Yakutat totaled 12.05 inches compared to a normal of 28.44 inches. It was the 4th driest spring since 1949. (Figure 2; Table 2)

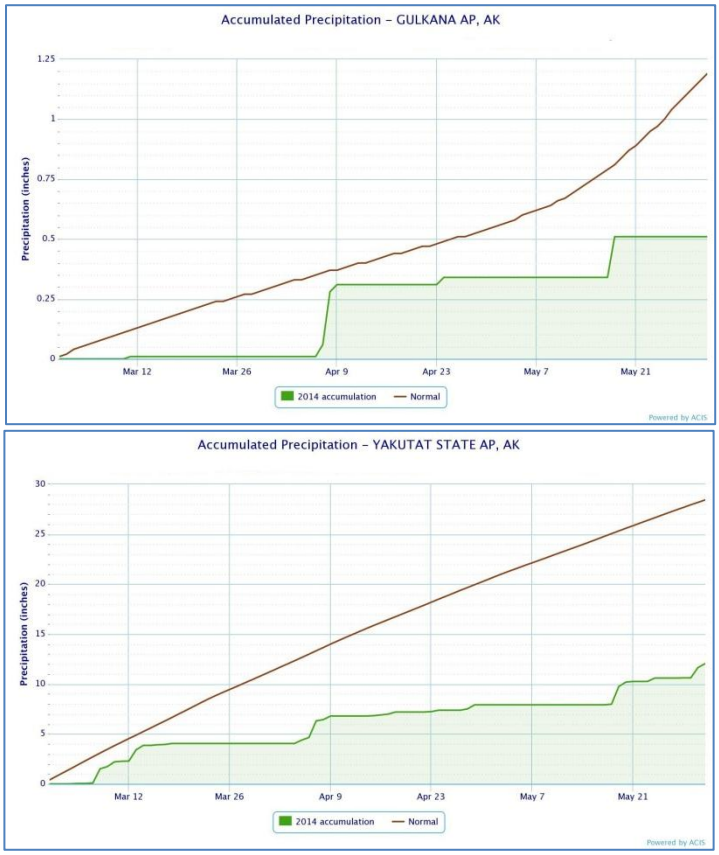



Figure 2. Spring **2014** accumulated precipitation at Gulkana (top), and Yakutat (bottom).compared to **normal** (brown line). The **wettest summers** at Gulkana (1985) and Yakutat (1991) are shown in blue.

**Table 1. Gulkana spring 2014 Temperature and precipitation compared to the 1981-2010 normal.**

| Gulkana Spring 2014 | Average Monthly Temp °F | 1981-2010 Normal °F | Departure from Normal °F | Monthly High °F / Date | Monthly Low °F / Date |
|---|---|---|---|---|---|
| **March** | 14.3 | 15.6 | -1.3 | 44 / Mar 13 | -19 / Mar 7 |
| **April** | 31.0 | 31.8 | -0.8 | 59 / Apr 30 | -11 / Apr 10 |
| **May** | 49.2 | 45.2 | +4.0 | 72 / May 16 | 26 / May 15 |

Spring Season Temperature Departure from Normal: +0.6°F

| Gulkana Spring 2014 | Total Monthly Precip. in. | 1981-2010 Normal in. | Departure from Normal in. | Greatest 24 -hr. total in. / Date | # Days with >=0.01 in. water |
|---|---|---|---|---|---|
| **March** | 0.01 | 0.30 | -0.29 | 0.01 / Mar 11 | 1 |
| **April** | 0.33 | 0.24 | +0.09 | 0.22 / Apr 8 | 4 |
| **May** | 0.17 | 0.65 | -0.48 | 0.17 / May 18 | 1 |

Spring Season Temperature Departure from Normal: -0.68 inches (43% of normal)

**Table 2. Yakutat Spring 2014 Temperature, Precipitation, and Snowfall compared to the 1981-2010 normal.**

| Yakutat Spring 2014 | Average Monthly Temp °F | 1981-2010 Normal °F | Departure from Normal °F | Monthly High °F / Date | Monthly Low °F / Date |
|---|---|---|---|---|---|
| **March** | 30.0 | 32.0 | -2.0 | 47 / Mar 25, 29 | 2 / Mar 6 |
| **April** | 37.2 | 37.8 | -0.6 | 56 / Apr 19, 21 | 18 / Apr 11 |
| **May** | 47.1 | 44.7 | +2.4 | 73 / May 2 | 28 / May 1 |

Spring Season Departure from Normal: -0.1°F

| Yakutat Spring 2014 | Total Monthly Precip. in. | 1981-2010 Normal in. | Departure from Normal in. | Greatest 24 -hr. total in. / Date | # Days with >=0.01 in. water |
|---|---|---|---|---|---|
| **March** | 4.05 | 11.04 | -6.99 | 1.42 / Mar 8 | 13 |
| **April** | 3.87 | 9.19 | -5.32 | 1.66 / Apr 7 | 13 |
| **May** | 4.13 | 8.21 | -4.08 | 1.77 / May 19 | 8 |

Spring Season Departure from Normal: -16.4 inches (42% of normal)

| Yakutat Spring 2014 | Total Monthly Snowfall in. | 1981-2010 Normal in. | Departure from Normal in. | Greatest 24 -hr. snowfall total in. / Date | Cumulative snowfall since 1-July in. | Snow Depth at end of month |
|---|---|---|---|---|---|---|
| **March** | 7.8 | 28.4 | -20.6 | 2.5 / Mar 8 | 100 | 2 |
| **April** | 5.8 | 10.2 | -4.4 | 5.7 / Apr 9 | 106 | 0 |
| **May** | 0 | 0.4 | -0.4 | --- | 106 | 0 |

Table 3. Summary of weather statistics from WRST climate stations. Note: Tana Knob was not collecting data in spring 2014 due to technical problems. All data are preliminary and subject to review.

| Site | Elev. (ft) | Average Temp °F | | | Spring 2014 Avg. Temp °F | Extremes °F | | Peak Wind mph | HighT – Low T °F |
|---|---|---|---|---|---|---|---|---|---|
| | | Mar | Apr | May | | High | Low | | |
| Chicken Creek | 5420 | 12.7 | 25.0 | 38.5 | 25.4 | 53 | 8 | 30 | 45 |
| Chisana | 3318 | 7.3 | 28.1 | 58.5 | 31.5 | 68 | -26 | 28 | 94 |
| Chititu | 4616 | 15.7 | 26.6 | 40.4 | 27.6 | 58 | -3 | 58 | 61 |
| Gates Glacier | 4060 | 17.0 | 27.5 | 41.4 | 27.5 | 54 | 1 | 27 | 53 |
| Klawasi | 3045 | 18.4 | 30.9 | 46.1 | 30.9 | 65 | -6 | 53 | 71 |
| May Creek | 1600 | 17.4 | 33.5 | 49.3 | 33.5 | 73 | -16 | 29 | 89 |
| Tebay | 2000 | 16.1 | 28.3 | 42.9 | 28.3 | 57 | -8 | 23 | 65 |

**Interesting notes from RAWS stations:**

- The average monthly temperature at Chicken Creek last April was 14.0° F, the coldest of the 10-year record. This year the average temperature for April was 25.0°F.

- The peak wind gust of 58 mph at Chititu occurred on March 10, part of a particularly windy week. The average wind speed for March 10-14 was 26 mph.

- On average,Chicken Creek (5240 ft) was 5.4°F warmer than nearby Chisana (3318 ft) in March. By May, inversions were less prevalent and Chicken Creek averaged 20.0°F cooler than Chisana.

## Climate Monitoring in Wrangell-St. Elias National Park and Preserve

The NPS climate stations in Wrangell-St. Elias are approaching the 10-year mark for climate monitoring (Figure 3). The NPS stations complement long-term records available from the National Weather Service stations in Gulkana and Yakutat. The NPS stations are providing critical data at higher elevations which helps characterize climate gradients and patterns affecting resources in Wrangell-St. Elias National Preserve. Table 3 summarizes the summer weather data for NPS sites.

We have added phenology cameras to some of the climate stations. These cameras capture images four times per day; the images are downloaded once a year. The images are used to help quantify the snow season, green-up period, and other basic phenologic information.

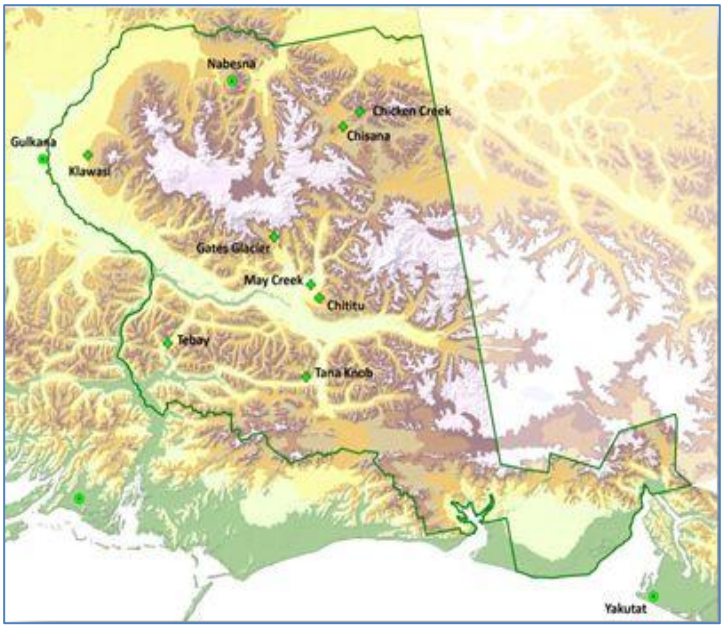



Figure 3. Map of NPS stations in Wrangell-St. Elias National Park and Preserve.

## Long-term Summer Temperature Trends

At Gulkana, the average spring temperature for 2014 was 31.5° F, which is 0.6° F warmer than the 1981-2010 normal (the latest climate normal period) and 1.0° F degrees warmer than the long-term average (1949-2014).

We calculate the average spring temperature by simply taking the average of March, April, and May monthly temperatures. Average spring temperatures show great variability with a range between 21.6°F in 1972 and 36.0° F in 2005.

At Gulkana, the overall increasing trend of 0.29°F per decade for spring temperatures is not statistically significant based on a simple linear regression (p=0.14). The 10-year moving average shows the warmest period in the mid-1980s through mid-1990s. The spring period over the past ten years has been near the long term average (Figure 4).

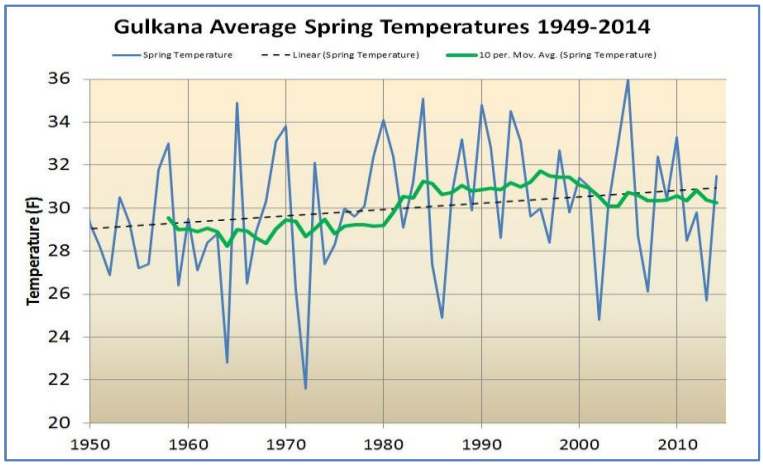



Figure 4. Average spring (March, April, May) temperatures in Gulkana since 1949. The green line shows the 10-year moving average. The dotted line shows a simple linear regression trend.

At Yakutat, the average spring temperature for 2014 was 38.1° F, which is 0.1° F warmer than the 1981-2010 normal (the latest climate normal period) and 1.0° F degrees warmer than the long-term average (1949-2014). Average spring temperatures show great variability (but less than interior sites such as Gulkana) with a range between 31.0°F in 1971 and 42.7° F in 1981.

At Yakutat, the overall increasing trend of 0.40°F per decade for spring temperatures is statistically significant based on a simple linear regression (p<0.05). The 10-year moving average shows the coolest period in the mid-1970s, followed by a warming trend through the mid-1980s. On average, the spring period over the past ten years has been about 0.5°F warmer than the long-term mean. (Figure 5).

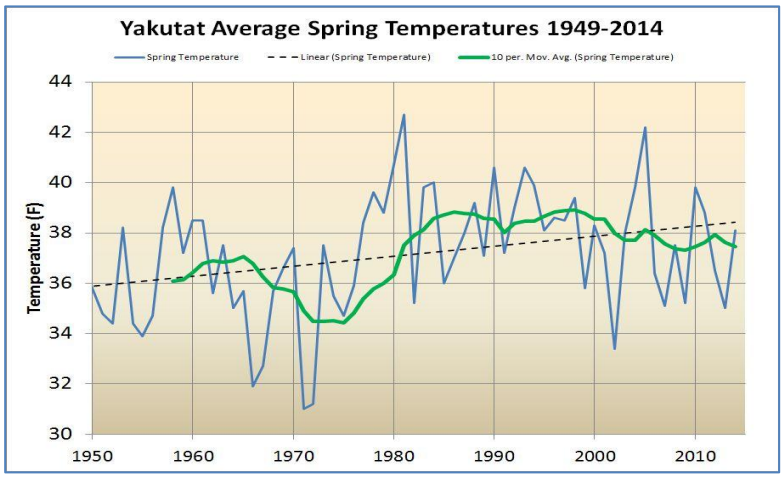



Figure 5. Average spring (March, April, May) temperatures in Yakutat since 1949. The green line shows the 10-year moving average. The dotted line shows a significant (p<0.01) linear regression trend.

## Connecting Further

- New paper published – Recent Sea Ice Increase and Temperature Decrease in the Bering Sea area, Alaska
- Previous weather summaries and other climate monitoring documents on the Central Alaska Network web portal
- Access near real-time data from Western Regional Climate Center and MesoWest
- Statewide summary of weather highlights in the latest Alaska Climate Dispatch from the Alaska Center for Climate Assessment and Policy
- Map of projected temperature and precipitation changes for Wrangell-St. Elias National Park and Preserve.

## More Information

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